DESCRIPTION

SWALLOW TAILED BOAT HULL

Technical Field

The present invention relates to an improved hull for water craft.

Description of Related Art

Water craft hulls typically have a pointed end known as the bow and widen in breadth toward the middle of the craft and then tend to narrow in breadth toward the stern. This traditional configuration of hulls is well known. The width of the hull at the waterline typically goes from a point at the bow to the widest about mid-ships and narrower at the stern. Displacement and semi displacement hull forms tend to narrow significantly at the stern while planing craft tend to narrow less at the stern and have a sharp angle where the bottom of the boat meets the transom.

As the average width at the waterline is significant for the stability of craft any narrowing of the waterline affects adversely the stability of the craft. contact with the water and more easily or even being able at all to Displacement and semi displacement hull tend not to have the sharp edge between the bottom of the boat and a transom which would help them to break come up on the plane.

Disclosure of Invention

According to the present invention there is provided a hull for water craft comprising traditional hull shapes with the hull splitting into two toward the stern with the width at the waterline being substantially maintained. The average waterline width is thus increased while flow of water past and under the craft is not significantly restricted. The inner part of splits may have a sharp angle where the two sides converge to facilitate the break with the water flow, which facilitates planing. The same configuration can be used on tunnel hulled and multi-hulled craft where wetted areas, sponsons, and pontoons can have port or starboard parts of the swallow tail to improve stability and speed. With a slight heel on the craft the swallow tails increase the waterline length and reduce drag. The sharp angle of convergence between the two sides of the swallow tail combined with its direction

slightly across the beam of the boat means that the craft more easily breaks contact with the water flowing past it thus making it possible for hulls which were predominantly semi-planing and displacement craft to have a possibility to plane.

Brief Description of the Drawings

A specific embodiment of invention will now be described by way of example in which: -

Figure 1 shows the underside of a monohull with a swallow tail:

Figure 2 show the underside of a tunnel hull or catamaran with a swallow tail forms on the sponsons or pontoons:

Figure 3 shows a cross section of a monohull and relates to station aa in Fig. 1.

Figure 4 shows a cross section of a monohull and relates to station bb in Fig. 1.

Figure 5 shows a cross section of a monohull and relates to station cc in Fig. 1.

Figure 6 shows a cross section of a monohull and relates to station dd in Fig. 1.

Figure 7 shows a cross section of a tunnel hull or catamaran and relates to station ee in Figure 2.

Figure 8 shows a cross section of a tunnel hull or catamaran and relates to station ff in Figure 2.

Figure 9 shows a cross section of a tunnel hull or catamaran and relates to station gg in Figure 2.

Figure 10 shows a cross section of a tunnel hull or catamaran and relates to station hh in Figure 2.

Figure 11 shows a cross section of a monohull with hook keels on the outer edges and refers to station bb on Fig. 1.

Figure 12 shows a cross section of a tunnel hull or catamaran with hook keels on both inner and outer edges of sponsons at station ff in Fig. 2:

Figure 13 show a side view of a hull with stations marked which relate to Figures 14 to 19:

Figure 14 shows a side view of a stern with station marking:

Figure 15 shows a cross section of a port side Swallow Tail at station ii on Figures 13, 14, and 19:

Figure 16 shows a cross section of a port side Swallow Tail at station jj on Figures 13, 14, and 19:

Figure 17 shows a cross section of a port side Swallow Tail at station kk on Figures 13, 14, and 19:

Figure 18 shows a cross section of a port side Swallow Tail at station ll on Figures 13, 14, and 19:

Figure 19 shows a view from above of a port side Swallow Tail suitable for a monohull, tunnel hull, or catamaran portside sponson or port float of a trimaran:

Figure 20 shows a side view of a hull with station markings that relate to station markings on Figures 21 –26:

Figure 21 shows a side view of the stern of a craft with station markings:

Figures 22 – 25 show cross-sections mm, nn, oo, pp, of a starboard swallow tail stern relating to station markings on Figures 20, 21 and 26:

Figure 26 shows a starboard swallow tail from above for the starboard side of a monohull, the starboard sponson of a tunnel hull or catamaran or the starboard float of a trimaran:

Figure 27 shows a cross section of a craft with both port station (ii) and starboard station (mm) Swallow Tails relating to Figures 13 – 26:

Figure 28 shows a cross section of a craft with both port station (jj) and starboard station (nn) Swallow Tails relating to Figures 13 – 26:

Figure 29 shows a cross section of a craft with both port station (kk) and starboard station (oo) Swallow Tails relating to Figures 13 – 26:

Figure 30 shows a cross section of a craft with both port station (ll) and starboard station (pp) Swallow Tails relating to Figures 13 – 26:

Figure 31 shows port side swallow tail at station kk where the craft is lying on an even keel.

Figure 32 shows the same section as 31 where the craft is heeled bringing the swallow tail up and making a sharper angle for water shear:

Figure 33 shows a stern view and Swallow Tails of an upturned hull:

Figure 34 shows a view of an upturned monohull with swallow tails:

Figure 35 shows a view of an upturned tunnel hull with swallow tails:

Figure 36 shows a cross section of a port hull section with rounded hook keels:

Figure 37 shows a cross section of a port hull section with angular hook keels.

Figure 38 shows a side view of an angular hook keel below a hull:

Figure 39 shows a side view of a rounded hook keel below a hull:

Figure 40 shows a view of the underside of the stern of a craft with swallow tails with concave fluted sections running along the hull to the swallow tail:

Figure 41 shows a cross section of a ports side swallow tail with concave sections:

Figures 42 shows a cross section of a starboard side swallow tail with concave sections:

Figure 43 shows a cross section of a port side swallow tail with concave sections on the inside and a concave section on the outside of the sharp edge:

Figure 44 shows a cross section of a starboard side swallow tail with concave sections on the inside and a concave section on the outside of the sharp edge:

Mode(s) for Carrying Out Invention

Referring to the drawings:

1 = a boat hull; 2 = the Bow; 3 = the Stern; 4 = a swallow tail hull section; 5 = a transom; 6 = a tunnel; 7 = a hook keel; 8 = a sharp edge; 9 = an inside side of a swallow tail hull section; 10 = an outside side of a swallow tail section; 11 = a waterline; 12 = an outside side concave section; 13 = concave sections; 14 = hatched areas denoting areas below the waterline – or wetted areas; 15 = keels; 16 = hull section connection

Referring firstly to Figure 1 , a water craft hull (1) viewed from below has a bow (2) with the body of the hull (1) extending to the stern (3) where it splits into two sections forming swallow tails (4) connected by a transom (5). The transom (5) may be located anywhere along the swallow tails (4) or forward of them. The swallow tails (4) may start to split from the keel (15) or keels (15) and splay out anywhere aft of mid-ships. The split may begin below the waterline and extend aft

below the waterline extending from the keel line (15) aft and outward toward the beam of the boat. The area of the hull (16) between the two inner sides (9) of the swallow tails (4) and the transom (5) will tend to be above the waterline, but need not necessarily be so. Where the two sides of the swallow tails (4), outer (10), and inner (9) meet, they form a sharp angle (8) that lies at the juncture of the two sides running from the keel or keels aft and outward toward the beam. The outer side (10) of the swallow tail (4) will tend to be rounded as it approaches the sharp junction (8) whereas the inner side (9) will tend to be more perpendicular and flat. Stations along the hull are marked aa, bb, cc, and dd, and relate to Figures 3 to 6.

Figure 2 illustrates a water craft tunnel hull (1) from underneath similar to Figure 1 with the addition of a tunnel (6) The features of the swallow tails (4) are similar to those in Figure 1. The stations ee, ff, gg, hh, relate to Figures 7 to 10.

Figure 3 illustrates a cross section of a watercraft hull and relates to station aa in Figure 1. In figure 3 the water line (11) is the line between the wetted area (14) and the rest of the hull at an area near the bow of the boat.

Figure 4 illustrates a cross section (bb) on Figure 1 of a hull near midships showing the central keel (15)

Figure 5 illustrates a cross section of a water craft hull Figure 1 at the station cc where the swallow tails just start to divide.

Figure 6 illustrates a cross section of a watercraft hull as in figure 1 at station dd where the swallow tails are more developed where (10) is outer side of the swallow tails (4) meet the inner side (9) at a sharp junction (8).

Figure 7 illustrates a cross section of a tunnel hull water craft at station ee on Fig. 2 where 6 is the tunnel near the bow end.

Figure 8 illustrates a tunnel hull water craft cross section about mid ships as in figure 2 at station ff. The tunnel (6) separates the two sections of the hull above the

waterline (11) and the wetted areas (14). The two keels (15) run along the bottoms of each side of the tunnel (6).

Figure 9 illustrates a tunnel hull water craft cross section at station gg in Figure 2. The swallow tails (4) are already forming at this station gg with a widening of the tunnel (6) below and near the waterline (11).

Figure 10 illustrates a tunnel hull water craft cross section as at station hh on Figure 2 where the swallow tails (4) are more developed. The tunnel (6) has widened considerably to form the swallow tails this close to the stern. The outer side (10) of the swallow tails (4) meet the inner side (9) at a sharp angle (8).

In Figure 11 is a shows a cross section of a water craft hull as at station bb in Figure 1 with "hook keels" (7) on each side of the craft angled down and outwards around and aft of mid ships.

Figure 12 shows a cross section of a tunnel hull water craft as in Figure 2 at station ff about midships or a little aft of midships with hook keels angled down and out both on the tunnel (6) side of the wetted areas (14) and the outer edges.

Figure 13 is s side view of a hull, sponson or pontoon (1) showing from the bow (2) to the stern (4) and a transom (5) with stations marked along the swallow tail area. The waterline being marked (11) and the hatched wetted area (14).

Figure 14 shows just the swallow tail area side view of Figure 13 with similar numbers as Figure 13 while Figure 19 shows a port side swallow tail (4) from above with related station markings to Figures 13 –19

Figures 15 to 18 show cross sections of a port side swallow tail at stations on Figures 13, 14, and 19. The swallow tail (4) diminishes in area toward the stern (4) The gradual diminishing in size both in draft, that is size of wetted area (14) and the narrowing of the swallow tail (4) means that at displacement speeds there is a smooth flow of water. At faster speeds the water flowing under the hulls can break

contact with the hull at the sharp edge (8) so craft, which were considered to only be displacement or semi displacement in shape and use, can gain some planing ability.

Figure 20 is a side view of a water craft hull, sponson or pontoon (1) from the bow (1) to the transom (5) with wetted areas hatched (14) below the water line (11). In addition stations mm, nn, oo, and pp are marked in the swallow tail (4) area. **Figure 21** is a side view of the swallow tail (4) area of Figure 20 while **Figure 26** is a starboard side view from above of a swallow tail where (10) is the outside side, which continues substantially in line with the beam of the boat and does not turn substantially in toward the keel line. (9) is the inside side of the swallow tail which curves outward in the stern area toward the outer side of the water craft to meet the transom and/or the outside side (10).

Figures 22 to 25 show cross sections of a starboard side of a swallow tail hull, or the starboard sponson or pontoon of a tunnel hull or multihull water craft that relate to stations mm, nn, oo, and pp on Figures 20, 21, and 26. They illustrate the narrowing and diminishing in size of the swallow tail toward the stern of the watercraft.

In Figure 22 showing a cross section of Fig. 20, 21 and 26 at station mm, the inside side (9) of the swallow tail has already moved outward from the keel line while the outside side (10) remains substantially in line with the outside line of the hull forward of it. The draft or depth of the wetted area (14) of the swallow tail (4) remains substantially the same as the hull forward of it. The juncture of outer side (10) and inner side (9) at this station may be, but does not necessarily need to be, as sharp as the juncture further aft.

Figure 23 shows a cross section of a narrowed swallow tail (4) at station nn on Figures 20, 21 and 26. At this station the draft or depth of the wetted area (14) below the waterline (11) and beam, or line of the outside side (10) may, though not

necessarily, diminish. The inside side (9) will have moved outward toward the beam of the boat in comparison to station mm.

Figure 24 illustrates a cross section of Figures 20, 21 and 26 at station oo. A continuation of any variations in dimensions in draft and width begun as illustrated in Figures 22 and 23 will continue at this station, generally, although not necessarily, in progressive degree.

Figure 25 is an illustration of a cross section of a starboard swallow tail section referring to station pp on Figures 20, 21 and 26. Here any progressive diminishing of width and depth will have continued so that the inner side (9) will have moved substantially outward toward the outside side (10) and at the juncture of the two sides the sharp edge (8) will have become sharper at, although not necessarily, less than 90 degrees angle.

Figure 27 illustrates a cross section showing port (ii) and starboard (mm) portions of a swallow tail on a hull, tunnel hull or multihull water craft, and refers to stations ii in Figures 13, 14, 15 and 19 plus station mm in Figures 20,21, 22, and 26 The inside sides (9) of the swallow tails have already started to move away from each other leaving a growing gap in between the joining part of the hull, widened tunnel or bridge deck (16) will tend to be, but will not necessarily be above the water line (11). The outer side (10) is at this station following substantially the same draft and beam line as the hull forward of it.

The two related stations in Figure 28, jj (port) plus nn (starboard), are aft of stations ii plus mm. Station jj relates back to Figures 13, 14, 19, and 16 while nn relates to Figures 20, 21, 26, and 23. Again any hull part joining them will tend to be above the waterline (11) but could be below it.

Figure 29 illustrates a cross section of port (kk) and starboard (oo) Swallow tails and relate to Figures 13,14, 17, and 19 plus Figures 20,21, 26 and 24 respectively. They

illustrate a cross section relationship aft of stations jj plus nn. The diminishing width and depth of the swallow tails becomes evident, as does the sharpening angle (8).

Figure 30 is an illustration of a cross section of port and starboard swallow tail configurations at stations ll, (port) and pp (starboard). The port side ll relates back to figures 13, 14, 18 and 19, while the starboard side pp relates back to Figures 20, 21, 25, and 26. The progression of the diminishing volume of each swallow tail (4) can be seen along with the sharpening angle (8) at the junction of the outer sides (10) and the inner sides (9).

Figure 31 shows station kk from the previous Figures where the water craft is horizontal on the water giving an area below the waterline (11) and a wetted area (14). The angle (8) of the juncture of sides (10) and (9) to the water flowing from it is less acute than in Figure 32.

In Figure 32 we have the same cross section station as in Figure 31 but here the boat is heeled as when sailing. Because the outer side (10) does curve inward even slightly, when the craft is heeled the aft most portion of the swallow tail will tend to be higher in relation to the water line (11). In addition the angle of (8) in relation to the water line will be more acute than when the boat is horizontal as in Figure 31.. These features make for less water resistance and less drag so that the boat can sail faster.

Figure 33 illustrates the aft section of an upturned hull will swallow tails (4) with transom (5) and connecting hull section (16).

Figure 34 shows an upturned hull (1) with keel line (15) dividing into the swallow tails (4) with transom (5) and connecting hull portion (16) between the inside sides (9) of the swallow tails. The sharp edge (8) of the juncture between the inside side (9) and the bottom of the boat or the inward curving outer side (10) forms a break point for water flowing out from under the hull which facilitates planing. The gradual narrowing of the hulls wetted area coupled with any diminishing in draft facilitates easy movement through the water at displacement speeds. The splayed

swallow tail (4) tends to capture water in waves moving from behind and so aids forward movement and surfing. The transom (5) and hull connection (16) also help capture water from waves from astern and so aid forward movement and surfing, particularly in conjunction with the swallow tails.

Figure 35 shows and upturned tunnel hull or a catamaran with a full length bridge deck with the tunnel (6) splaying out at the swallow tails (4) The advantages with this type of craft are similar to those mentioned in reference to Figure 34, but in addition the swallow tails can have the effect of sucking water through the tunnel (6) and helping forward motion.

Figure 36 is an illustration of a cross section of a sponson or pontoon where the hook keels (7) both on the beam and keel line are in a rounded profile.

Figure 37 is an illustration of a cross section of a sponson or a pontoon where the hook keels (7) are of and angular profile.

Figure 38 shows a side view of an angle hook keel (7) below a hull (1) with (2) pointing to the bow end and (3) pointing toward the stern.

Figure 39 shows a side view of a curved hook keel (7) with the same orientation as Figure 38.

Figure 40 illustrates the underside of a swallow tail (4) with a tunnel (6) Concave profiles (13) run along the underside of the swallow tails (4) to meet the outer side (10) at the sharp edge (8) in a series of curves. The concave sections give more edges for a greater variety of water release as water moves past the craft.

Figure 41 shows a cross section of a port side swallow tail (4) where the outer side (10) remains substantially the same as in a swallow tail without concave sections. The inner side (9) is built up in a series of concave sections which run from the hull section forward of the swallow tails and progressively end in a series of curves at (8).

Figure 42 shows a cross section of a starboard side of a swallow tail (4) with the same characteristics as the port side in Figure 41.

Figure 43 is similar to Figure 41 but with a concave section (12) on the outside side (10).

Figure 44 is similar to Figure 42 with the addition of a concave section (12) on the outside side (10).

Further modifications and improvements may be incorporated without departing from the scope of the invention herein intended.